

## WHAT IS CLAIMED IS:

1. A feedforward amplifier, comprising:

a pilot reference generator that generates a pilot signal;

a first carrier cancellation loop;

5 a first error amplifier loop including a first error amplifier, wherein the pilot signal is utilized to provide gain stabilization in the first error amplifier

a third loop;

a second carrier cancellation loop that includes a first phase  
10 and amplitude adjuster in module and a second amplitude and phase adjuster disposed between module and module, wherein the pilot signal is utilized to control the adjustment of the second carrier cancellation loop.

2. A feedforward amplifier according to claim 1, wherein  
15 the first error amplifier loop further comprises:

an injection coupler, wherein the pilot signal is injected through the injection coupler;

an error amplifier having an input that receives the pilot signal that is injected through the injection coupler and an  
20 output,

wherein the output of the error amplifier is sampled at a sixth coupler to provide a sampled pilot signal and an unsampled pilot

signal, wherein the sampled pilot signal is coupled to an IQ detector.

3. A feedforward amplifier according to claim 2, wherein the unsampled pilot signal is received via the injection coupler.

5 4. A feedforward amplifier according to claim 1, further comprising:

a sampling coupler for sampling the unsampled pilot signal from the first error amplifier path of the first error amplifier loop, and reinjecting the unsampled pilot signal into the carrier  
10 cancellation loop to provide a reused pilot signal in the carrier cancellation loop 2B.

5. A feedforward amplifier according to claim 4, further comprising:

a first phase and gain adjusting circuit,  
15 wherein the sampled pilot signal is coupled to the first phase and gain adjusting circuit; and

a second phase and gain adjustment circuit,  
wherein the adjustment of the carrier cancellation loop by the second phase and gain adjustment circuit does not affect the  
20 adjustment of any other loop.

6. A feedforward amplifier according to claim 5, further comprising:

a second error amplifier module, wherein the sampled pilot signal is coupled to the second error amplifier after being coupled  
5 to the first phase and gain adjusting circuit.

7. A feedforward amplifier according to claim 6, further comprising:

an error signal injection coupler, wherein the pilot is reinjected at the error signal injection coupler; and

10 a pilot receiver, wherein the pilot is coupled at the pilot receiver after being reinjected at the error signal injection coupler.

8. A feedforward amplifier according to claim 7, wherein the pilot reference generator, comprises:

15 a quadrature modulated signal generator comprising a sinusoidal signal oscillator operating at a first frequency;

a power splitter having two output ports closely matched in amplitude but differing in phase by 90 degrees at a first frequency;

a first signal multiplier;

20 a second signal multiplier;

a power summer having two output ports closely matched in amplitude and phase at the first frequency, wherein the output of the summer is a quadrature modulated pilot signal;

a first sinusoidal signal oscillator operating at a second  
5 frequency; and

a second sinusoidal signal oscillator operating at a third frequency.

9. A power amplifier, comprising:

an input comprising a multicarrier signal;

10 a pilot generator that generates a pilot signal;

a first loop that utilizes the pilot signal, wherein the first loop comprises a main amplifier block that amplifies the multicarrier signal, wherein the main amplifier block includes an adjustable vector modulator;

15 a second loop that includes an error amplifier block that includes a first error amplifier; and

a feedback path between the first error amplifier and the main amplifier block that allows the second loop the reuse the pilot signal to maintain a phase and an amplitude of the main amplifier  
20 block.

10. A power amplifier according to claim 9, wherein the feedback path comprises:

a first detector that detects a peak multicarrier signal level at a coupler termination and generates common signals that are used to control the main amplifier block and the error amplifier block to reduce distortion in amplified multicarrier signal; and

5 a coupler, wherein a controlled level of the multicarrier signal is reinjected from the error amplifier at the coupler to reduce the magnitude of the multicarrier signal at a coupler termination and thereby cancel intermodulation distortion in an output signal.

10 11. A power amplifier according to claim 10, wherein the first detector is coupled to the main amplifier block and the error amplifier block.

12. A power amplifier according to claim 10, further comprising:

15 means for adjusting phase and gain controls based on the peak multicarrier signal level at the coupler termination.

13. A power amplifier according to claim 12, wherein the first detector generates the phase and gain control signals which are injected into pilot generator and used to maintain phase and  
20 delay of the output of main amplifier block at an initial value.

14. A power amplifier according to claim 12, wherein the error amplifier is coupled to an output of detector, and wherein the phase and gain control signals maintain the phase and delay of the output of main amplifier block at an initial value by causing  
5 the error amplifier to compensate for degradations caused by drift over time at the same rate as the degradations occur.

15. A power amplifier according to claim 9, further comprising:

10 a second vector modulator;  
a second terminated detector; and  
a second error amplifier block.

16. A power amplifier according to claim 9, further comprising:

means for phase and gain control of the first error amplifier.

15 17. A power amplifier according to claim 10, further comprising:

a summing junction;  
a divider junction that generates a positive input to the  
summing junction;  
20 a delay block; and  
a coupler, wherein the output of the pilot signal generator

is coupled with a delayed output of the main amplifier block at the coupler to provide a signal that is fed into the first detector.